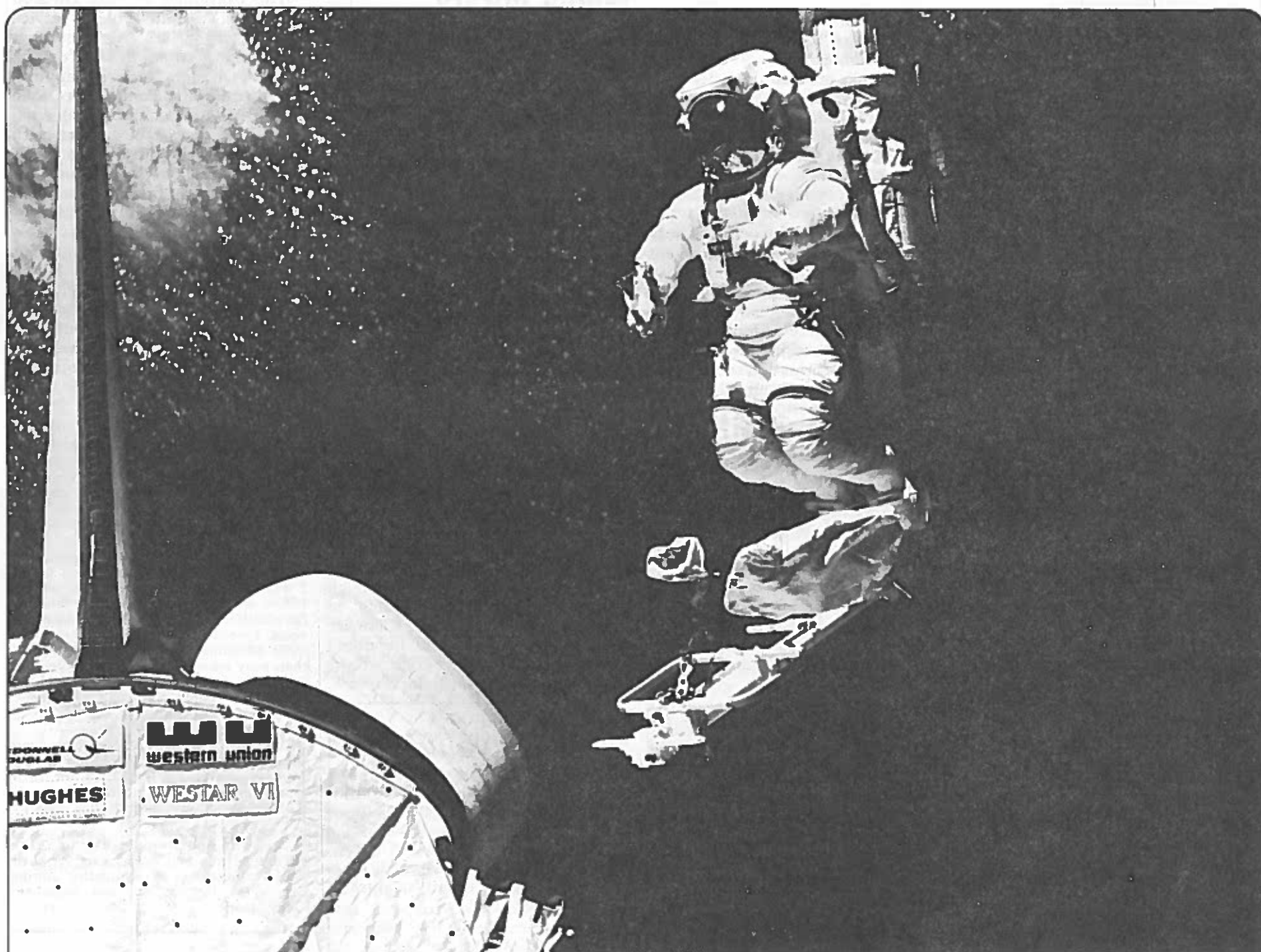


GRUMMAN plane news

Vol. 43, No. 6, March 23, 1984, Bethpage, N.Y. 11714



MFR makes its space debut

Astronaut Bruce MacCandless ran the Grumman-built Manipulator Foot Restraint (MFR) work platform through a gamut of tests in space during the Shuttle mission last month. The MFR will be used during the upcoming Shuttle flight slated for April, when astronauts repair the Solar Max satellite. Also onboard the Shuttle will be some Grumman experiments. See pages six and seven for more details. (NASA photo)

EIP match

The company's matching contribution to the Employee Investment Plan will continue to be 100 percent for the second quarter of 1984 (April, May and June).

For every dollar an EIP investor contributes to the plan — up to four percent of a member's annual base salary — the company will contribute another dollar.

Fresh start in '84

Last year, Grumman began providing employees with an all-cause deductible in the Travelers-administered medical insurance plans. So, instead of submitting a separate claim for each illness — with each illness subject to the \$100 deductible — Grummanites now only have to accumulate over \$100 in expenses for any illness within a calendar year before being eligible for benefits.

However, this requires employees to submit, with their first medical bills for the year, a new First Notice of Claim form. This is regardless of whether treatment during

1984 is a continuation of services received in 1983.

After the First Notice is submitted, Grummanites only have to submit their doctor's bills (specifying diagnoses), as well as prescription receipts, etc. This is true even if they go to more than one doctor in the course of the year.

If the First Notice of Claim isn't submitted with the first bill for services in 1984, the claim will be delayed.

Desks for sale

Grumman Property Disposition has plenty of used metal desks for sale to Grummanites.

The desks are double pedestal in grey and tan. Each is \$30 plus tax.

Interested employees should obtain an Employee Sales Form (GAC No. 5531) at their Employee Services (ES) office, fill it out, and mail it to Property Disposition, A04-17.

Do not call. You will be notified by phone for an appointment to inspect the desk. You must pay by check or money order and must remove the merchandise at the time of sale. Property Disposition will not hold any merchandise. Photos and more information about the desks are available in all ES offices.

Two for one gift

Do you make monetary gifts to your favorite college or university? For every dollar a Grummanite contributes, Grumman Corporation will give two dollars through its Matching Gifts Program. If you gave during 1983, the program must have a copy of your receipt by *March 31* for your gift to be matched.

Send receipts to Carol Nelson, A12-GHQ.

Pl. 56 brigade

In ceremonies held at Grumman Aerospace's Plant 56 in Glen Arm Md., Baltimore County Fire Department's Deputy Chief W. "Woody" Bannister administered the "oath of office" to members of the newly formed Grumman Fire Brigade, last month.

Headed up by Chief Dave Case and his staff of officers — Captains Bill Groff and Dennis Wiederkehr, and Lieutenants Rick Cooper, Bill Kohlbus, and Ron Mason, the newly organized fire brigade recently completed two days of extensive training in fire fighting techniques at the Baltimore County Fire Academy. While Chief Case and many other members of the Glen Arm's Fire Brigade have professional fire

fighting training via membership in their hometown volunteer fire departments, the two-day training seminar was deemed invaluable in sharpening the skills of the Brigade.

All-volunteer brigade

Comprised of both men and women employees, the Glen Arm plant's all-volunteer 43-member Fire Brigade was formed for the purpose of providing protection against possible fire and emergency situations at the Glen Arm plant.

Media library moves to NYC

The Public Affairs media library will be distributed by West Glen Films, Inc., as of April 1, 1984.

The library consists of 16mm films and 3/4-inch videotapes. They are available for external use by Grumman employees, civic groups, schools and professional societies. A full listing of these materials is available from Public Affairs, Plant 25, Ext. 8919.

The following procedures must be followed to reserve materials from the library:

- Reservations should be limited to three films/videotapes at one time.

- Two complete weeks notice must be given in advance of the date on which the materials are to be used to ensure their availability. Reservations are handled on a first come, first served basis. Some of the titles are in limited supply, so reserve early.

- The library lends 16mm films and 3/4-inch videotapes. Though some selections are available in both film and tape form, there are exceptions. These will be noted in the list. (Sorry, Public Affairs does not lend VHS, Beta, Super-8,

or any projection/playback equipment.)

- Reservations can be made by calling the West Glen Films library (212) 921-0966. Request materials by title and number. (VC stands for videocassette.)

- Return postage is the responsibility of the requester.

The address of the film/video library is: West Glen Films, 1430 Broadway, New York, N.Y. 10018.

Consumer pubs

The Consumer Services Division of the N.Y. State Public Service Commission offers free consumer publications to all New Yorkers.

The Division receives approximately 5,000 complaints each month. Its staff analyzes each complaint and assists customers with their problems with utilities (gas, electric, telephone, steam and water). Last year, consumers received \$3.4 million in credits as a result of the Division's investigations.

For a listing of the free consumer publications issued by the Public Service Commission, write to: NYS Public Service Commission, Consumer Services Division, Outreach and Education, Three Empire State Plaza, Albany, N.Y. 12223.

Personals

My family and I wish to express our sincere thanks and appreciation to my friends, co-workers and ESO for their support, understanding and kind expressions of sympathy during the recent loss of my young brother. Peter Otero

My sincere thanks for honoring me with a surprise farewell retirement party. I was truly overwhelmed to see all my fellow workers, especially those whom I have not seen or worked with in many years. I would also like to thank management personnel, who took time out from their busy schedule to attend. My years at Grumman have been good ones, and my last day certainly will be a memorable one. Frank DiRocco

My family and I wish to express our sincere thanks and appreciation to my friends, co-workers and ESO for their kind expressions of sympathy during the recent loss of my father. Dick Erdody

My wife and I would like to thank all my friends and co-workers for their kind expressions of sympathy during the recent loss of our son Jonathan. Larry Mead

New York Air National Guard

The New York Air National Guard is currently seeking people with prior military service who had electronics experience in the service or at Grumman.

At the present time, the Air Guard base at Roslyn, N.Y., has vacancies in teletype communications repair, flight facilities repair, radar repair, outside wire and antenna maintenance, cable splicing, telephone switching, and many other electrical career fields.

Non-prior service people are also welcome to apply. The Air Guard at Roslyn meets once a month and two weeks annually. If they qualify, veterans may retain their previous rank up to and including E-5. Benefits include: base exchange privileges (spouses, too); retirement (previous military counts); training; travel; and excellent pay.

To see if you qualify, call today for a future tomorrow. Ask for Master Sergeant Dennis Layer, (516) 621-1422 or 299-5216.

Unit values

The following are unit values for the Grumman Employee Investment Plan as of January 31, 1984. These unit values are compared to the precedings month's values (December 1983).

Equity Fund
2.385 down from 2.502
Fixed Income Fund
3.481 down from 3.538
Guaranteed Income Fund
1.755 up from 1.739
Company Stock Fund
\$23 down from \$24.25

**Next edition
of Plane News:
April 13th**



Stuart team delivers 100th Boeing 767 unit

On March 23, the Grumman team at Stuart Operations in Florida completed the 100th wing-fuselage center section for the Boeing 767 commercial jet airliner.

The first delivery was made over three years ago in December 1980. Grumman has been building these units under a multi-million dollar contract with the Boeing Commercial Airplane Company. Production is

expected for at least several more years.

Pictured with the Stuart team above, the wing-fuselage center section measures 27 ft. long by 16 ft. wide and is shipped in a special railroad car to Boeing's final assembly plant at Everett, Washington, just north of Seattle. The highly fuel-efficient Boeing 767 airplane started into commercial service in September 1982 and is now operating with 11 major airlines throughout the world.

Composite chopper job progresses at Pl. 66

Milledgeville Operations work on Bell Helicopter Textron's Model D292 — one of two designs set to become the first helicopters with airframes built nearly all of composite materials — is progressing right on schedule.

Grumman's share of the work on the Advanced Composite Airframe Program (ACAP) for the U.S. Army was moved down to Plant 66 in Georgia late last year. Since that time, the Milledgeville team has been working feverishly on completing approximately one-third of

all the composite parts for the aircraft, including roof structures, floors and fuel cell bulkheads. Composite parts will eventually add up to about 85 percent of the total structural weight in the Bell design.

Milledgeville is currently working on the parts for the second ACAP helicopter — the Flight Test Vehicle (FTV). The parts for the first ship, the Tool Proof Article (TPA), were made entirely in Bethpage. In Phase II of the Bell ACAP effort, the FTV parts are scheduled to be ready for testing later this spring.

According to Dave Haskell, ACAP program coordinator in Milledgeville, "We started production on the composite parts for the FTV on December 1, 1983, and we are currently in the process of completing work for Bell in preparation for assembly. Milledgeville will also manufacture the full composite configuration for ship number three — the Static Test Article (STA).

"Right now we are on schedule and moving along well. We hope that our efforts and our technology help Bell win the Army contract for a new generation of lighter, more efficient composite construction helicopters."

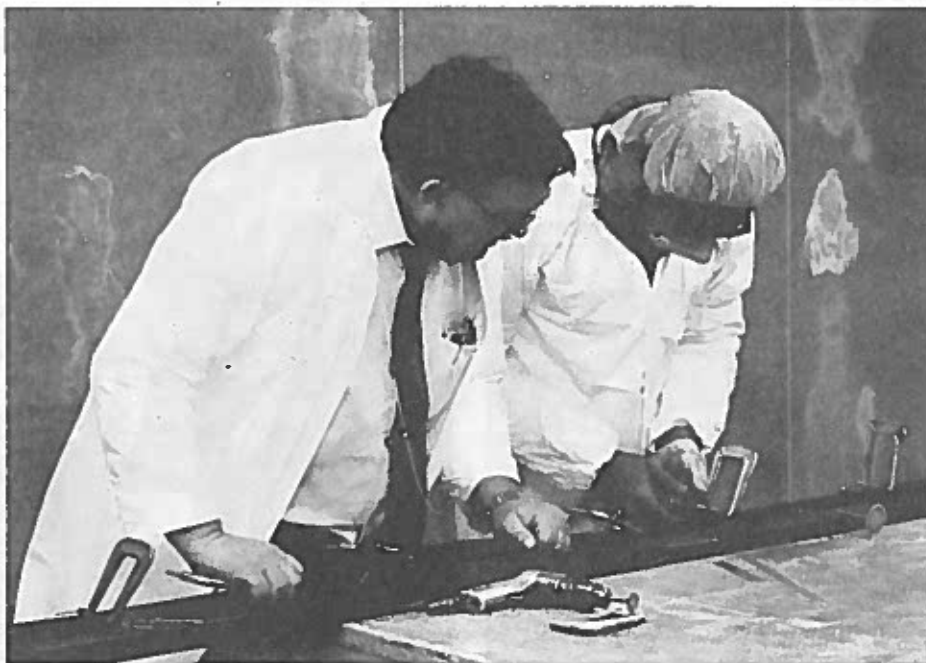
The Bell/Grumman design is competing against one from Sikorsky Aircraft in the Army's ACAP project. Haskell notes that while the composite work for the Army's new helicopter is still regarded as a research-and-development program,

"Plant 66 has already developed some of the best and most advanced composite technology — tooling and information — in the industry." If the Bell design does win the Army's contract, he says, "the Milledgeville operation is ready and waiting for the job.

"Our technology here is geared specifically for work on this type of

project. The Plant 66 personnel — along with our tooling designs and materials knowledge — are the best in the field," he adds.

"It may be some time before we find out about the Army's contract decisions regarding the ACAP future, but there is no doubt that Milledgeville is ready and willing to continue our part."



Milledgeville ACAP effort. "The ACAP program is complex due to the variety of composite materials used and structural configurations required. However, Plant 66 has assembled a team that really wanted to do the job and the results have proved it," says Hans Borstell, senior Materials and process engineer (L), shown with PL. 66 trim room leadman Alex French.

GRUMMAN plane news

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Grumman salutes '83 innovators;

Grumman Aerospace saluted the top suggesters of 1983 at the 18th annual Project Sterling Awards Dinner on Tuesday, March 6, at the Milleridge Cottage in Jericho.

The top 14 suggesters of 1983 and 38 "super savers" received Project Sterling awards which ranged from \$250 to \$1,500.

Top idea man of the year was Rick Macklem who hails from Stuart Operations in Florida. He collected \$1,500 (tax-free) for his suggestion.

A leadworker in Prototype, Plant 77, Rick designed and built a handling system that outperformed other systems on the market. "We needed a material handling system to be able to handle the heavy metal sheets that we work with on the Ironmaster machine," says Rick, who has been with the company for 11 years. The Ironmaster is a big, sophisticated machine that can shear angles, channels and flat plates, in addition to punching holes.

"The commercial handling system was expensive," states Rick, "so I started to design our own." Using scrap iron and various leftovers, he not only designed and built a material handler system that could do the job — it was also cheaper and better than the ones on the market.

"In fact, the commercial ones don't move away, they are fixed," he said. "Mine moves away, so there is plenty of room to work." In addition, Rick's invention is calibrated, so workers can measure the metal pieces right on the handling system.

Like fellow top suggestors at the dinner, Rick was surprised that he would win even more money for his award-winning suggestion. "I thought we'd get a nice dinner and maybe a plaque," he said.

Instead, Rick collected \$1,500 in cash. Added onto his previous



Tops in '83. Top award winner Rick Macklem is flanked by Ed Dalva, vice president-Stuart Operations; and Frank Messina (R), vice President-Manufacturing.

award prize of \$1,600, Rick's earnings from this idea alone comes to \$3,100. "Since I didn't plan on winning more money, I'll probably invest it," states Rick.

A good investment

Last year, over 2,800 employee suggestions were submitted. Cash awards for approved suggestions totalled \$147,394; first year savings to the company added up to over \$7.3-million.

Other top suggesters of 1983 who received monetary awards and

trophies at the Project Sterling awards dinner were:

\$1,000 — Albert Francis, electrician in Electrical Bench Assembly. \$750 — Dennis Robiski and Stephen Cacace, both technicians in Flight Avionics.

\$500 — Joseph Beine Jr. leadworker, Prototype; Charles Heege, leadworker, Maintenance Rearrangement; and Anthony DeDeo, millwright facil., Maintenance Rearrangement. William Newman, plane captain, and William Winslow, leadworker, both of Flight Opera-

tions. Julie Clark, engineering aide, Stability Control.

\$250 — Redell Coffey, stock clerk, Stock Rooms. Helen Knell, buyer, General Commodities. Charles Hammerslag, illustrator, publications, ILS Tech. Illustrations. Evelyn Doherty, group leader, ILS Publication Production. Everett Hall, machinist, Hydraulics.

Super Savers saluted, too

The Super Savers awards were given to those Grummanites who contributed significantly to the Project Sterling Suggestion Program in 1983 in the area of high-cost savings for Grumman Aerospace.

Those who received \$250 awards were:

Ed Holmes, engineer, Computer Architecture; Michael Dunn, inspector, major assembly, O.C. Insp. Mech.; Murray Pittel, group leader of Loads and Criteria, and Paul Levitt, load and dynamic engineer, Loads and Criteria; William Capaldo, manager of Central Shipping Management.

Vincent Russo, office planning administrator, and John Spinosa, assistant planning administrator, both of Department Operations Management; Frank Daum Jr., controller, Government Material Control; John Shest and Richard Anderson, both engineers in ILS Verification.

Benjamin Pelt, leadworker, Composites, and Shepherd Little, engineer, Matl. & Process-Assembly Technology. Bernard Beal, technician, Structural Design; Lorraine Gallo, junior accountant, Contract Revenue.

Michael McEnergy, analyst, Technical Requirements; John Brennan, supervisor, B/P Warehouse; Frank Smalto, engineer, ILS Auto Test; John Ruggiero, analyst, Inventory Control.

Raymond Cubells, subcontract administrator, General Subcontracts; Lee Brandt,



Runner-up. Senior Vice President Phil Vassallo, director of Corporate Material Operations, presents second place award to Albert Francis.



Super savers in '83. These Grummanites made suggestions which saved the company big bucks last year. The company awarded each winner a (tax-free) check of \$250. (Photos by Marie Trimborn)

Rick Macklem named top suggester

group head; all of Corp. Inst. Ground Test.

William Schooley, group leader, Structural Design; Charles Gillie and Larry Howard, both material handlers, Material Control; Lawrence Org, mech. proc. engineer, Manufacturing Engineering.

Godfrey Maynor, Quality engineer, Great River Ops Q.C. Engineering; Onofrio Florio, group leader and Morris Duffner, engineering specialist, both of ILS RF Controls; Jose Munoz, buyer, General Subcontracts; John Shea, project engineer, Facilities Administration.

Bernard Poelker and Kevin Barclay, both engineers, ILS Auto Circuit Analysis; Constantine Loucas, tech/elec. in VAST-Elec. Test, and Paul Moody, ILS Auto Circuit Analysis; Curtis Hart, coordinator in Materials Control and Edward Schultz, leadworker in Elec. Box Pan.; Theodore Campbell and Moshe Friedman, both engineers in Computer Aided Structural Analysis.

Gerard Peithman, group head; John

Herba, group head; and Charles Belensky, inspector, and Johnny Simons, associate engineer liaison, both of Technology, GA.

Nicola Narciso, engineering specialist, Software Analysis; Norman Palmer, group leader, Parts Control; Irene Cassidy, buyer, Central Purchasing; Steven Kuzma, NC machine processor; Richard Swindler, machine profile; Ronald Mason, NC machine processor; Frederick Siperko, NC machine processor, all of Machine Shop.

Henry Pagliocca, engineer, Engineering Computer Systems; George Adesso, assistant manager, Production Supervisor; Anthony Biagiotti, engineer, ILS Equipment Test; Minnie Mazzola, clerk, Material Control.

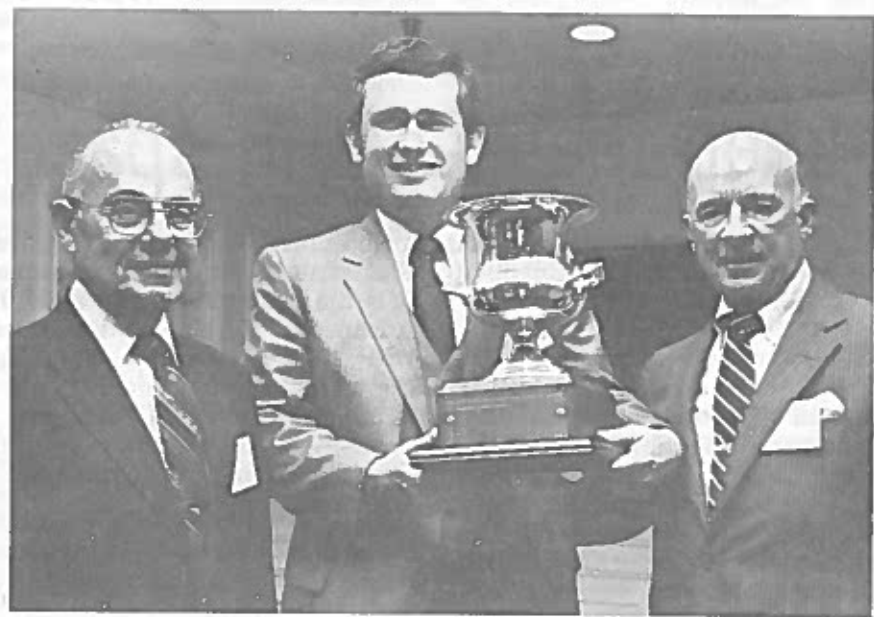
Thomas Burns, field rep., Comm. Program Management; Shepherd Little, Engineer, Material and Process; Timothy Higgins, designer, ILS Site Requirements; Kevin Barclay, engineer, ILS Auto Circuits.



Think about it. Third-place finishers Stephen Cacace (L) and Dennis Robiski combined forces.



In the money. Fifth place winners are (L to R) Helen Knell, Everett Hall, and Redell Coffey.



The cup goes to Georgia! Tom Lahey (C), deputy general manager of Milledgeville Operations, holds the Project Sterling Participation Cup, while Vice President Ed Dalva and Vice President Frank Messina (R) look on.

Ideas pay off

Milledgeville earns Project Sterling Cup

The folks in Milledgeville Operations (Ga.) made history in 1983 when they submitted more Project Sterling suggestions than any other operational center at Grumman Aerospace.

In fact, their participation rate for the year was 78 percent as compared to the company average of approximately 15 percent. In recognition of this high rate of participation, the people at Milledgeville now have the Project Sterling Participation Cup in their possession.

Tom Lahey, deputy general manager of Milledgeville Operations, accepted the Cup from Frank Messina, vice president of Manufacturing, at the 18th annual Project Sterling awards dinner on March 6.

Though Grummanites in Milledgeville only get to keep the Cup until the next Project Sterling dinner in 1985, there is a lot of ground other centers have to gain before they seriously threaten to take the Cup from Georgia soil.



Ideas pay off. Bob Myers, senior vice president-Resources, presents awards to fourth place winners (L to R) Charles Heege, Anthony DeMeo, Julie Clark, Joseph Beine Jr., and William Winslow.

Time to sign up for annual meeting

The annual meeting of Grumman shareholders is scheduled for 2 p.m. on Thursday, April 19, in Plant 4. Starting March 19, Bankers Trust Company, agent for the trustees for the Grumman Employee Investment Plan, began mailing Plan members proxy statements and confidential cards for voting at the annual meeting, says Bob Bradshaw, Grumman Corporation secretary.

Employees are asked to return the completed cards by April 11 to Bankers Trust Company in the self-addressed, postage-paid envelope that accompanies the proxy statements.

Because Grumman shares obtained through the Investment Plan are held in trust for each individual member, being a Plan member does not automatically entitle participants to attend the annual meeting, says Bradshaw. Only those persons owning shares of record — that is, shares purchased outside the Investment Plan prior to the record date of March 1, 1984, are eligible to attend.

Grummanites who own company shares as of the record date (March 1, 1984) and who wish to attend the meeting should present their proxy card to any Employee Services (ES) office before April 11 in order to pre-register. Your proxy card should then be mailed immediately in the return envelope provided.

EIP meets March 29

The annual meeting of the Grumman Employee Investment Plan (EIP) will take place Thursday, March 29.

All plan members are invited to attend the meeting, which starts at 5 p.m. in the Plant 28A auditorium. Representatives of the fund managers of the equity, fixed income, and guaranteed income funds will be present as well as representatives of the bank recordkeeper.

Those who will not be able to attend will be able to read a summary of the EIP meeting in a future issue of *Plane News*.

Kapton: a contender for space radar

During the next mission of the Space Shuttle, a Grumman-developed plastics experiment will go into orbit.

The two-part experiment will involve Kapton, a duPont-tradenamed polymer possessing high strength and high temperature resistance. It will actually be one of two experiments Grumman Aerospace will have aboard LDEF, the Long Duration Exposure Facility (see accompanying article). LDEF, an aluminum cylinder-shaped structure measuring about 30 feet long by 16 feet in diameter, will be launched from the Shuttle's cargo bay on Day Two of the mission (April 7). It will remain in orbit for between 10 and 11 months and will be retrieved by a later Shuttle crew.

Kapton film will be tested for use in the makeup of a future space-based radar (SBR) satellite. SBR satellites would provide military surveillance, as well as non-defense information, from both low and high orbits.

The way the LDEF program has been set up by the National Aeronautics and Space Administration (NASA), participating companies and institutions are only provided with an experiment tray, which gets fastened to the LDEF frame. The participants must provide their own support equipment — power supplies, computerized control and data-gathering devices, and the like.

An R&D effort

The experiment was developed by Dr. Richard Delasi and his co-workers in Grumman Aerospace's Research and Development Center. "We are flying a proprietary, Grumman-designed Kapton laminate proposed for space-based radar," he says. "The Grumman Research and Development Center selected Kapton for the experiment, and the Advanced Materials and Process Development Department came up with a way to laminate Kapton, keeping it flat over a long period of time."

The three-layer antenna consists of a layer of the proprietary Kapton laminate on both sides of a super-thin sheet of perforated aluminum. As such it will be a small portion of the actual SBR aperture.

Half the experiment will count the number of electrical discharges occurring on the Kapton surface when high voltage is applied. "Such discharges can take place in the space environment, but we don't know how frequently they will occur," Delasi says. "We will determine whether these discharges cause damage to the Kapton antenna material in orbit."

"Also, discharges may be more frequent at certain times during orbit. When LDEF comes back, the data collection devices will give us enough information to correlate the number of electrical discharges with where in orbit they occurred."

Unique data system

In this half of the experiment, the Kapton laminate is fastened to the tray, and a blanket of thermal insulation is placed underneath the laminate. Below that is a high-voltage power supply. Under the tray itself are the experiment's batteries, as well as two electronic black boxes — one containing the data memory, which was designed by the Grumman Engineering Department's Digital Technology group, and another containing the data counters, timers, and on-off circuitry.

The data system is a unique

engineering design that features very low power consumption and non-volatile memory — in other words, data is not lost when power is turned off.

Keeping in shape

The other half of the experiment will test the *dimensional stability* of the basic Kapton film — how well it will maintain its shape in space. Thin polymers all have "creep" properties — they stretch in response to tension — but Kapton has been shown to be highly creep-resistant in lab tests.

However, in space, there are rapid, extreme temperature fluctuations, and the experiment will find out how well Kapton resists creep in such surroundings. Two layers of Kapton strips will be suspended on spools, and a spring-loading assembly will pull the

material at different tensions. One layer will be fully exposed to the space environment, while the layer underneath will be shielded and thus acts as a control specimen. When LDEF is brought back, both layers will be compared to laboratory control specimens.

Delasi explains the rationale for the experiment: "The space based radar satellite will unfurl in space, and the antenna plane will be required to hold its shape. The complex thermal and radiation environment of space, which is extremely difficult to simulate in the laboratory, may have impact on its ability to do so. The satellite will be large, but lightweight and easily deployed."

Radiation in space, from the sun and from the Van Allen Belts (a belt of intense ionizing radiation that surrounds the earth in the upper atmosphere, named for James Van Allen), may have added effects on both parts of the experiment, so these will also be analyzed.

Will heat pipes keep their cool in space?

Heat pipe technology is expected to play an increasingly important role as a means of thermal control for future space projects — particularly the space station and communications satellites. Grumman Aerospace will take part in a unique heat pipe experiment beginning April 7.

That's the day the experiment — along with over 50 others — will be launched into orbit from the Space Shuttle. The experiments will be housed on the Long Duration Exposure Facility (LDEF), a first-

of-its-kind laboratory platform that will be retrieved by the Shuttle 10 to 11 months later.

According to Fred Edelstein, project engineer for Advanced Thermal Systems in Space Programs, and the developer of the experiment, "the advantages of heat-pipe technology for space structures have already been demonstrated in the laboratory. LDEF will permit us to test the heat pipe's capabilities in zero gravity for an extended time period."

The official title of the Grum-

man experiment is the Transverse Flat Plate Heat Pipe Experiment. It is the culmination of a \$250,000 Advanced Development contract with NASA-Marshall Space Flight Center. It would ultimately be used to keep batteries and electronics on a satellite at a uniform temperature, and is patented for Grumman by Edelstein.

Many types

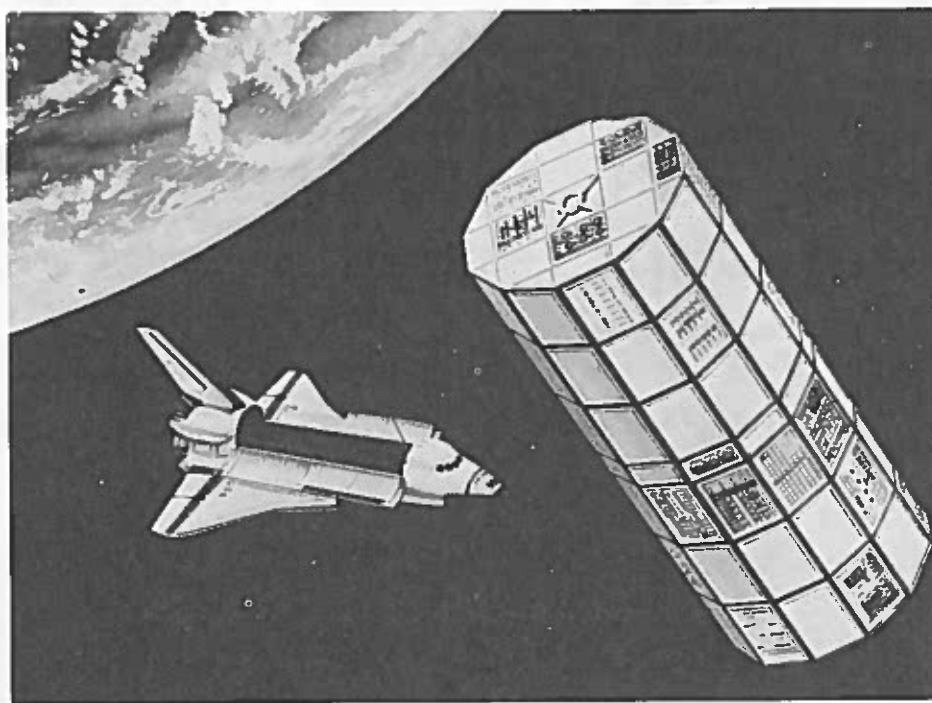
A heat pipe is a sealed enclosure or tube containing, in a liquid and vapor state, a single substance. There are many different types of heat pipes using a variety of fluids. Grumman's flat plate pipe contains methyl alcohol.

Such a structure transfers heat through evaporation and condensation. It uses some of the same principles as refrigeration, but instead of a condenser pumping the contents around, a heat pipe relies on capillary action — the movement of liquid through very small tubes, grooves, or mesh structures.

This phenomenon is used, for example, to draw kerosene up a wick in the familiar home kerosene heater, and can be compared to the movement seen when a thin straw is placed in a glass of liquid. The liquid will move a certain distance up the straw — the narrower the straw, the more the movement. A heat pipe contains very small capillaries. But in space, the movement of the contents will be much greater than on earth, since there will be no gravity to overcome.

The fourth and last Orbiting

(Continued on page 10)



Space laboratory. The Long Duration Exposure Facility (LDEF) will house over 50 experiments, among them two from Grumman. It will remain in orbit 10 to 11 months.

Successful shakedown

MFR ready for repair mission in space

Before long, repairing satellites as they orbit the Earth will become routine for astronauts using the Grumman-built manipulator foot restraint (MFR).

The MFR made its space debut aboard Shuttle 41-B in February. Next month, Shuttle astronauts George Nelson and James von Hoften will use the MFR to repair the Solar Maximum Mission observatory satellite.

Basically, the Grumman MFR is a work platform that allows an astronaut to work in a stable position with toolboards mounted in close reach for satellite repairs. It is approximately three feet long at the base and three feet high. It has foot restraint slots for the astronaut's feet, a tool carrier, a toolboard and a payload connecting device.

The MFR is easily attached to the Shuttle's remote manipulator system (RMS), a maneuverable composite arm almost 50 feet long. This arm is controlled from the Shuttle, while the astronaut on the work platform controls the MFR.

Super premiere

During the February Shuttle mission, astronaut Bruce MacCandless put the MFR through its first zero-gravity shakedown. "The MFR passed its first tests in space," reports Bill Mebes, MFR program manager. "All systems are go for the Solar Max repair mission."

Grumman designed and built four MFRs for NASA — two test articles and two space-worthy units

— in the Product Development Operations Center in Plant 5. The space units had no trouble on the scales. "Both were delivered under NASA weight requirements," states Mebes.

A slew of testing

Prior to its first voyage into space the MFR underwent extensive testing by both NASA and Grumman. NASA has put the MFR through its paces in the neutral buoyancy of the water tank at Johnson Space Center in Houston which simulates zero-gravity conditions.

Grumman has also conducted an array of tests using the LASS (Large Amplitude Space Simulator) in Plant 14. LASS creates all the movements and dynamic sensations of the work station.

In fact, astronauts MacCandless and Jerry Ross spent several days in November 1982 running through the repair procedures that astronauts Nelson and van Hoften will use to fix the Solar Max Mission satellite next month. Both Shuttle astronauts have also visited Grumman in August 1983 to use the LASS in preparation for their April mission.

While the Grumman MFR will demonstrate its usefulness as a work platform for satellite repair in space this April, the MFR also has other uses. It can be used as a stable platform for astronauts to perform cargo bay experiments, for assembly of large structures in space, and for performing in-orbit repairs to the Shuttle.



Service bay. During the February Shuttle mission, astronaut Bruce MacCandless uses the Grumman MFR work platform on the end of the Shuttle's manipulator arm to simulate repair of the Solar Max satellite's main electronics box. The astronaut operates a power tool to undo screws and fasteners holding wiring in the box, demonstrating one of the repairs that is slated to be performed on the satellite in April. (NASA photo)

Grummanites at Goddard keep close eye on Solar Max

Grummanites at the Goddard Space Flight Center in Greenbelt, Maryland, are working hard to make the Solar Max repair mission — scheduled during the next Shuttle flight — a success.

Solar Max is short for Solar Maximum Mission observatory satellite. From a 300-mile-high orbit, Solar Max's integrated package of seven different experiments — instruments — would monitor various facets of solar activity. The focus of attention is on solar flares — high-energy explosions on the surface of the sun that affect satellite trajectory, radar systems, electronic communications, and weather patterns.

Grumman was selected by NASA in 1979 as Flight Operations contractor for Solar Max. Once it was launched — in February 1980 — ground control and command of the spacecraft and experiments became Grumman's responsibility.

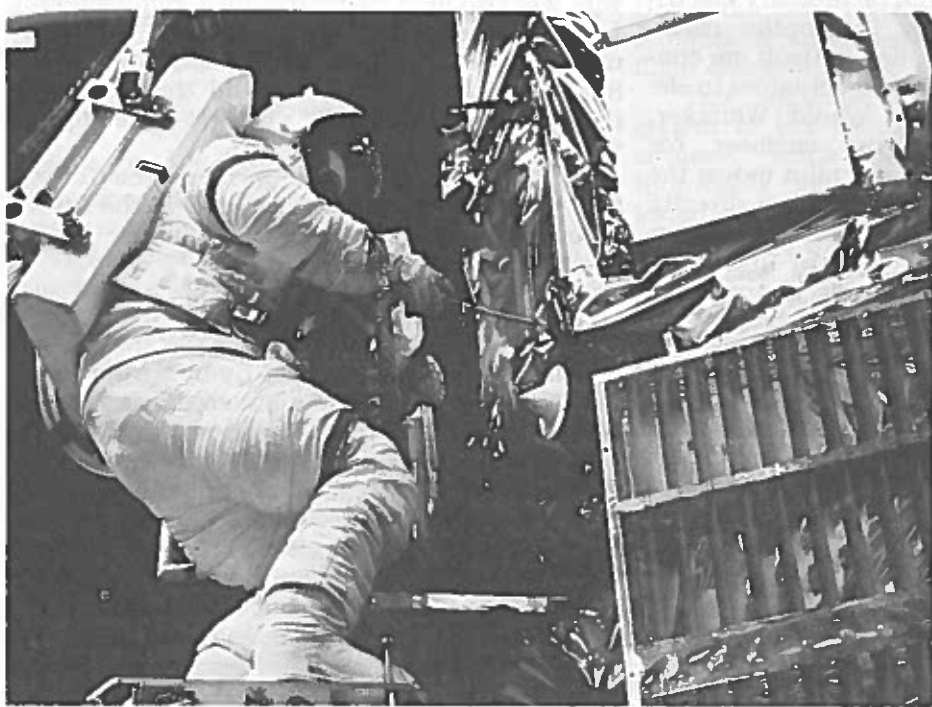
After 10 months of successful operation, fuse failures occurred in Solar Max's Attitude Control Module. The satellite is now in a quasi spin-stabilized mode. Thus,

only three of the seven experiments can return any meaningful data. So, repairing Solar Max during the upcoming Shuttle mission has been given top priority.

The Shuttle will rendezvous in Space with Solar Max. Astronaut George Nelson will use the manned maneuvering unit (MMU) — a backpack propulsion device that permits astronauts to venture untethered outside an orbiting spacecraft — to dock with and stabilize the satellite. The Shuttle will then grasp Solar Max with the remote manipulator system (RMS) and place it onto the flight support system (FSS) inside its cargo bay.

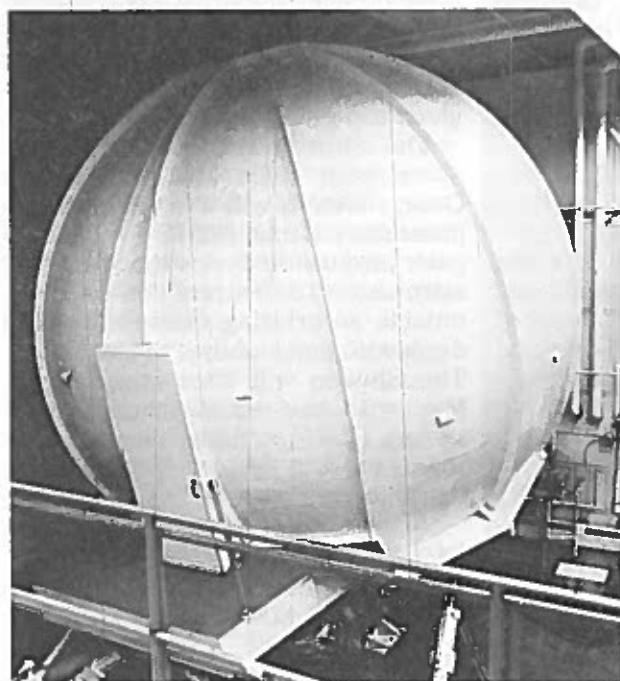
After Solar Max is securely latched onto FSS, the Grumman team at Goddard will power down the Shuttle's systems so that Astronauts Nelson and "Ox" Van Hoften can begin repairs. The astronauts will then attach the Grumman-designed and built manipulator foot restraint (MFR) workstation to the end of the RMS. Using the

(Continued from page 10)



Practice makes perfect. Back in November 1982, NASA astronauts Bruce MacCandless and Jerry Ross practiced repairing the Solar Max mock-up in Plant 14's LASS.

An aerodynamic challenge



Sneak preview. Pilot Tom Gwynne (top) gets a visual rendition of what it's like to fly the X-29 using the Motion Based Simulator (bottom, an outer view). At middle is the camera apparatus that creates the visual display Gwynne sees.



Revolutionary. Forward-thinking. Highly advanced. Intriguing. All are adjectives used to describe Grumman's experimental X-29 Technology Demonstrator aircraft, which is set to fly this fall. And much of the innovation the X-29 represents is on the inside, within its fly-by-wire flight control system.

Grummanites have been hearing the term "fly-by-wire" for a number of years now, but many are probably still confused about exactly what it means. Put very simply, fly-by-wire enables the control surfaces on an aircraft — rudder, flaps, etc. — to be moved by electronic command. An array of wires, sensors, computers, and other devices replaces the mechanical parts — cables and pulleys or pushrods and bellcranks — found on a conventional plane. And the wire in the term fly-by-wire could be ordinary electrical wire, coaxial cable, or fiber-optics cable.

"On an ordinary plane, pilot controls are connected directly or via hydraulic actuators to the control surfaces," explains Arnold Whitaker, flight control system project engineer for Grumman's X-29 Program. "The pilot moves the controls and thereby transmits motions directly to the control surfaces. In high performance aircraft, such as the F-14, this type of flight control isn't sufficient. So, an electrical apparatus supplements the mechanical or mechanical-hydraulic systems.

"Fly-by-wire is where those electrical signals command the entire flight control system. Mechanical input is zero; there's no mechanical linkage. The system is also lighter than hydraulic/mechanical systems."

In maneuvering the X-29, the pilot moves the stick, which sends the plane's flight control computer a command. The computer calculates — in a very small fraction of a second — the control surface movements needed for the plane to perform the desired maneuver. The computer, in turn, sends a command to an actuator, which moves the surface.

The flight control system also senses flight conditions, commanding control surfaces to continually readjust themselves. This provides

the X-29 with stability in flight while minimizing drag — the force that retards the forward motion of an aircraft.

Not a new concept

According to Whitaker, although it's not in widespread use, fly-by-wire isn't a new concept. "We aren't originating the use of digital fly-by-wire," he asserts. "But we are applying it to a unique aerodynamic configuration."

The technology dates back to the late Sixties. In fact, during the early Seventies, there were a number of experimental aircraft that employed fly-by-wire technology. The F-16 was the first operational plane to utilize it, and later in the decade, the F-18 became the second. Fly-by-wire was also used to control the Grumman-built Lunar Module (LM), which brought the astronauts to the moon, and is presently used in the Space Shuttle. The X-29 would thus represent the first Grumman-built plane to be equipped with it.

Whitaker feels it's the wave of the future. "Few military planes will be built in the future without fly-by-wire," he says. "In the X-29's case, it cannot fly without it."

Stabilizing influence

The X-29 will depend on fly-by-wire because it will have a great degree of aerodynamic instability — in other words, it will pitch (a nose-up or nose-down movement) easily.

"An airplane in flight is continually balancing the loads on its wings with an opposing load on its tail," explains Bob Roemer, X-29 Program director. "That aerodynamic 'seesaw' keeps the plane straight and level, but it also adds to the drag. Stability — the tendency to return to straight and level flight after a movement of the controls — is designed into planes through proper sizing and placement of horizontal and vertical stabilizers. They must be designed for the most critical conditions, which happen to require the largest amount of control surface. The

nge: stabilizing the X-29 in flight



Tests in progress. (Far L) Bob Solomon, Kevin Dowling, Bill Yearsley, and Mike Solan monitor the results of Gwynne's "flight" in the Plant 14 Hybrid Computing Facility. In a separate test (L), Orlando Vescio and Mark Rausch monitor hydraulic pressures of the X-29 actuators and other components using the X-29 Hydraulic Test Stand. Bob Godas (above L) adjusts the visual display for the Motion-Based Simulator. (Above R) Pilot Phil Marsh (R) "flies" in the fixed-based simulator, while Cheryl Mastriano, Vinnie Amari, and Ray Annabel monitor the results.

rest of the time, those surfaces are simply carried around, contributing drag."

The advantages of an unstable aircraft are less drag (and likewise, more fuel efficiency), as well as greater maneuverability. Whitaker predicts the X-29 will surpass the F-14 in this area, and he terms the F-14 "the very best plane to date in terms of maneuverability at high angle of attack. The F-14 has capabilities in that range that no other airplane has."

The challenge of an X-29 is that its flight control system must provide artificial stability. No human pilot can respond quickly enough or often enough to provide the necessary control of the plane during maneuvers. In a fly-by-wire plane, that's done electronically by the flight control system. Interestingly enough, the X-29 utilizes off-the-shelf components — for instance, the actuators are from the F-16 and the nose and cockpit are from the F-5.

Innovative computer array

The X-29 will actually have three flight control systems. Each will consist of a digital and an analog computer as well as their respective power supplies. All three systems will operate constantly, but in only one mode at once (analog or digital.) If one digital system fails, the remaining two will take up the slack.

However, if two of the digital computers fail, the flight-control system then switches to analog. Then again, if an analog computer fails, there are two other analog systems to take over. The risky business would be at the point of fourth computer failure, but Whitaker notes that the chances of reaching that point are slim.

"The risk of a fourth failure is extremely minute, and smaller than the risk of incurring a mechanical failure," he attests.

The use of digital technology for flight control is still relatively new. On the F-14, for example, the flight control system is all analog. In a digital system, the flight-control "rules," so to speak, are all in its software. This makes such a system more easily modified than its analog counterpart,

where the rules are hardware-based.

The catch is, however, that there is still little flight safety software that's been developed.

"We are still learning how to design flight-safety software," Whitaker says. "That's why we have the analog systems as a backup. Ultimately, we hope to eliminate the need for this."

Extensive testing

Whitaker continues: "The technology exists. The successful execution of it depends on very careful design and testing."

Many of those tests are being conducted right now in a specially built laboratory in Plant 14. The entire X-29 flight control system is now housed in this lab. A fixed-base simulator and a moving base, domed simulator give pilots a sneak peak at what it will be like to fly the plane. Down the hall, a Hybrid Simulation Computer provides a mathematical model of the X-29's flight characteristics.

"This simulator makes the flight control system in the laboratory think it's flying the airplane," Whitaker says. "We are testing it more thoroughly than the actual aircraft could be tested, using multiple failures, severe maneuvers, and flight outside the design envelope."

Whitaker says the three analog systems have completed their round of tests, while the digital systems and overall tests will finish sometime in May.

"We'll also be conducting numerous tests on the plane itself, utilizing special equipment, to verify that the laboratory model is really like the airplane," he says.

Other advancements

All of the X-29's futuristic features tend to go hand-in-hand with each other. In addition to being a demonstrator for forward-swept wing design and fly-by-wire, the X-29 will present a host of other high-tech concepts.

For example, a forward swept wing has to handle much more aerodynamic stress than an aft-swept one, so it's got to be made of super-strong material. If Grumman were relying on

conventional materials, the wing would also be heavier. Instead, the wings are constructed from composites, providing a high degree of rigidity without a consequent increase in weight. Composite wings also can be aeroelastically tailored — their plies laid in such a way that they bend and reduce stress.

Another innovation will be the use of a thin, supercritical airfoil — the cross-sectional shape of a wing that influences its lift and drag characteristics. In theory, a supercritical wing will achieve low drag at transonic speeds. Wind-tunnel tests and computer analyses have shown the many advantages of this type of airfoil, and a few aircraft now in production feature relatively thick supercritical wings. However, no thin supercritical wings have been constructed and flight-tested on a real plane. The X-29 will be the first.

For greater maneuverability, the camber (the engineer's term for curvature) of the airfoil will be variable during flight, thanks to trailing-edge flaps on each wing. But, as Whitaker points out, this benefit in turn results in a pitching moment — a nose-up or nose-down movement that must be adjusted.

A very distinctive feature of the X-29 will be its canards — those wing stubs that project from the fuselage forward of the wings. The canards pivot during flight to trim the pitching moment and equalize the air upwash on the wings — the direction of air hitting the different parts of the wings. This helps to keep the roots (parts of the wing connected to the plane's body) and tips of the wings at the same lift properties.

Whitaker adds: "Another approach would be to trim that flap pitching moment with a tail, but that would reduce the plane's lift characteristics. With the canards, the pitching moment is adjusted, while the positive lift capabilities of the X-29 design are maintained."

In Whitaker's view, the tests have progressed to the point where "there's no question that the flight control system will work." He is also confident that the X-29 will pass its flight test with flying colors.

Nelsons will be rooting for 'Pinky'

Astronaut George Driver "Pinky" Nelson, who will be aboard the Space Shuttle on its April mission, was in Bethpage last summer to test the Grumman-built manipulator foot restraint (MFR). While here, Pinky also had a chance to visit his Uncle, Bill Nelson, who works in Plant 30.

Bill isn't the first Grummanite in this astronaut's family. Pinky's father, George Vernon, worked at Grumman briefly during 1941. Pinky's grandmother, mother of George and Bill, was employed here during the World War II years. And Bill's wife Lois — Pinky's aunt,

works in Plant 35-Specifications.

Bill's brother George settled in the Midwest after the war, and Pinky grew up in Wilmar, Minnesota. But the large Nelson family did manage to get together for visits every few years. Bill recalls that Pinky became interested in space at a young age.

"He was always interested in astronomy, ever since his grandfather (Bill's father) gave him a telescope when he was a small child," he says. "He went on to get his doctorate in astronomy from Seattle University.

"He was a civilian who saw a notice for prospective astronauts.

He applied, and was named an astronaut candidate in the last class of 30 people to be named."

"Everybody in the family is very proud of him, but we've tried to be very low-key about it," says Bill. "That is, until his shuttle mission

was scheduled. Now everyone's gotten really excited."

Pinky will wear the NASA backpack, which permits astronauts to venture untethered out of the Space Shuttle. He'll retrieve the damaged Solar Max satellite, bringing it to the Shuttle for repair using the MFR.

Asked where he'll be while all this is happening, Bill replies: "Glued to the TV set!"

Solar Max job keeps Grumman team busy

(Continued on page 7)

MFR, they will replace the malfunctioning attitude control module with a redesigned module.

During the remainder of the first six-hour extra-vehicular activity (EVA) period, the astronauts will start the replacement of the main electronics box (MEB) of the coronagraph/polarimeter experiment. After the astronauts have finished the first EVA, the Grumman team at Goddard will power up the spacecraft, reload the on-board computer and begin checking the spacecraft.

During the second EVA, the astronauts will complete the replacement of the MEB. Then, using the RMS, they will unberth the satellite from the FSS and lift it above the Shuttle so the Grumman team can deploy its high gain antenna. After further checks on the RMS, the Solar Max will be turned loose and the Grumman team will begin the 30-day check-

out and calibration of the spacecraft and experiments before returning it to normal operations.

"Turning the Solar Max back into a useful scientific vehicle is only a short-term benefit," states Joe Blazosky, Grumman program manager at Goddard. "The procedures developed during the repair mission are long-term benefits. They will be the building blocks for future routine in-orbit repair operations and satellite servicing from the Shuttle and the Space Station."



Groundwork. Astronaut George 'Pinky' Nelson — nephew of Grummanite Bill Nelson — visited Grumman last summer to practice repair procedures he will perform on the Solar Max in April.

More on heat pipe experiment

(Continued from page 6)

Astronomical Observatory (OAO) — which Grumman built — was the first satellite to utilize heat-pipe technology. It was launched in 1972 and is still in orbit, though it was deactivated in 1981. OAO-4 had a heat-pipe system mounted to its telescope support structure, keeping the temperature uniform.

Previous heat pipe experiments in space have included the Thermal Canister, tested aboard the third Shuttle mission, and the Monogroove Heat Pipe, which was tested on the eighth.

Unique opportunity

LDEF will orbit in low altitude — several hundred miles, which is the same orbit as that of the Shuttle. Trays on the LDEF frame will be mounted facing out, and typically measure about three-feet-long by four-feet-wide and one-foot-deep.

Edelstein says the LDEF experiment will provide more in-depth data than would be possible on the Shuttle. "The Shuttle experiments

answer the question of whether a system will work or not," he comments. "Long duration heat pipe experiments give us an idea of whether such units will work over a long period of time and whether there will be any degradation."

The experiment's three heat pipe modules have already been installed in the tray, and bolted to LDEF. At pre-timed intervals, heat will be supplied to the evaporator side of each module by a battery power supply. Three identical "on" times are planned during the experiment's duration, each lasting about 13 hours, or eight orbits. The first will occur about a month after launch, with the second 67 1/2 days later, and the third 67 1/2 days after that. This will enable study of any performance changes during the duration of the LDEF orbit.

Information to be collected will include: the heat pipes' capabilities for transporting heat, temperature drops through the units, as well as their overall ability to maintain temperatures and any degradation

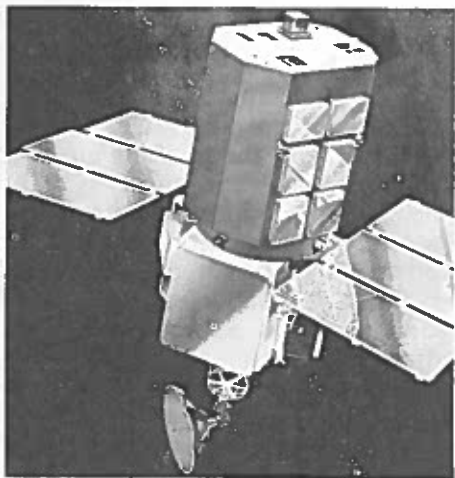
in their performance. All this data will be needed, Edelstein says, if transverse flat plate heat pipes are to be considered for future space applications. Their strong points are their light weight and long life.

Similar experiments aboard

Among the 50-plus LDEF experiments are a variety that involve heat pipes. There's even another one in which Grumman played a minor role, the NASA-developed Low Temperature Heat Pipe Experiment Package (HEPP).

Grumman was awarded a \$100,000 NASA contract to assemble and test the HEPP experiment. At this point, Grumman's involvement ended.

HEPP will maintain a cryogenic, or extremely low, temperature of 182°K, which translates to -132°F. It has possible uses for thermal control on infrared-sensor satellites. A cryogenic system would be better suited for space than mechanical refrigeration, Edelstein says, since it would have no moving parts.



On the repair list. The Solar Max satellite is scheduled for the first repair job in space during the next Shuttle mission in April.

A physician's view of drug abuse

This is the third article in the "Drugs in the Workplace" series. In the following interview, Dr. Vincent Gallagher, deputy director of Grumman's Medical Department, discusses prescription drug abuse.

Plane News: *Exactly what is involved in a prescription drug abuse problem?*

Dr. Gallagher: In discussing any prescription drug abuse problem, the first thing you have to do is separate the drugs into what are known as "controlled substance classes." Controlled substances are essentially types of drugs that are classified by the state and federal governments. The classifications are based on such characteristics of the chemicals as addictive properties and potential for abuse.

For instance, for a doctor to be able to prescribe a class I drug to a patient, such as cocaine or heroin, he is required to have a special federal narcotics license in addition to a Drug Enforcement Agency permit number. The rules are so strict, in fact, that class I drugs are generally not available at all on a prescription basis.

Plane News: *What kind of drugs are available from doctors on a prescription basis?*

Dr. Gallagher: Well, class II through class V substances are available on a prescription basis from doctors. Barbiturants and narcotics are in the

higher class II level. Other drugs considered less dangerous are in the categories down through class III and IV.

Plane News: *Which drugs or class of drugs is most commonly associated with prescription abuse problems?*

Dr. Gallagher: Most of the drugs that are generally found likely to be abused fall into either class III or IV. These drugs are part of a chemical family called benzodiazepam. Benzodiazepams include a whole host of drugs that are

dosages or the frequency of the doses — and quite often both.

Plane News: *Why would a patient take it upon himself to deviate from his doctor's instructions regarding any drug?*

Dr. Gallagher: The patient might reason that if just one of the pills that his doctor prescribed works pretty well then a few more might work even better. He might then begin to lean too heavily on the prescription, taking the drug whenever he feels tense or even when he thinks he might have to face a

away and you feel good. In a few hours, the drug wears off and you don't feel so good anymore. Maybe the pain is worse than before, so you take another pill, and maybe even step up the dosage to a couple of pills to make the effect last longer — and so on along the path to an abuse problem.

Plane News: *When people go beyond their doctor's instructions for a prescription drug, do they realize that they are abusing drugs?*

Dr. Gallagher: You have to try to understand that the people who are abusing prescription drugs have obtained these substances under an aura of legality. The fact that a doctor has told them to take these drugs further legitimizes taking them. People don't feel that they are doing anything wrong, because they obtained the drugs legally and they are under the care of a doctor.

Plane News: *Obviously doctors don't want their patients abusing the drugs that they are prescribing. In addition, state and federal regulations limit the amount of drugs that any one doctor can prescribe to a single patient. How then do those people who are abusing prescription drugs get enough of the substances to continue their abuse?*

Dr. Gallagher: Quite simply, they go to other doctors. There is no way that a doctor can tell — short of doing a good deal of testing — whether a person is already taking a drug prescribed by another doctor. There are cases where people have been found to have eight or more prescriptions for a drug from eight or more different doctors and eight or more different drug stores. The people who want to abuse a given drug will simply go from doctor to doctor, one after another, until they get enough prescriptions to continue their habit.

Plane News: *How can a person who has a prescription drug abuse problem be identified? Are there any symptoms that are noticeable? Any specific to the workplace?*

Dr. Gallagher: A lot depends on what drug is being abused, but in general, a worker who is having a drug abuse problem will likely be very lethargic and disinterested on the job. The person very often is not cognizant of his work surroundings — making for a real safety hazard. Other symptoms include a higher rate of absenteeism, health-related problems and a dramatic fall off in the quality of the person's work.



'Soon, the patient is taking the tranquilizers just to cope with the common daily stresses that we all have to deal with'

Dr. Vincent Gallagher

commonly prescribed by doctors. The most famous and generally recognized is valium. Along with other similar drugs in this class, valium is probably the most popular tranquilizer prescribed and used in the world.

Plane News: *What is it about these particular drugs that makes them the most commonly abused prescription medicines?*

Dr. Gallagher: Basically, it's their availability. Minor tranquilizers like valium and librium are often prescribed by doctors to help people who are complaining about anxiety and/or stress. Patients come to a doctor's office saying they are unable to get any sleep or relax enough on the job to concentrate properly because they are too nervous. Nothing specific, just anxiety and stress.

Plane News: *Then, doctors prescribe these drugs for relief from anxiety?*

Dr. Gallagher: If it is indicated, a doctor may prescribe a tranquilizer with specific guidelines for its use — a prescription. An abuse problem develops when the patient decides to deviate from those guidelines, either increasing the

stressful situation. Soon, the patient is taking the tranquilizers just to cope with the common daily stresses that we all have to deal with, to the point where he simply can not deal with the reality of his life without the help of the drug.

Plane News: *Besides the minor tranquilizers that you have mentioned, what other prescription drugs are commonly involved in abuse problems?*

Dr. Gallagher: The next most abused class of prescription drugs are the painkillers — narcotic substances like Demerol, Darvon, Percodan, and other powerful drugs. The way a person would most likely get addicted to something in this family of drugs is to have gone into a hospital for surgery and have been given injections of something such as Demerol for post-operative pain. When the patient is discharged, he might then be given a prescription for a slightly less potent painkiller — Percodan is most common in this instance.

These drugs are designed to make the patient feel physically more comfortable — to relieve pain. If you're in pain, then you take one of these pills and the pain goes

Help is available

Grumman Personnel Relations is available for advice and assistance to help Grummanites and their family members with chemical dependency problems.

Substance abuse problems — including alcohol, prescription and illicit drugs — are handled in complete confidence. Grummanites can get help by dialing HELP (Ext. 3521).

In the case of illicit drug abuse, it has been noted that people are especially reluctant to seek help because of the illegal nature of the problem. Personnel Relations stresses that it is not in the business of law enforcement but rather in the personnel assistance business. All requests for help are dealt with on a strictly confidential and individual basis.



A. Umbach



R. Carlson



G. Sanfilippo



C. Seaman



J. Bailey



E. Galatro



E. O'Rourke



J. Warren



A. Bainton



B. Verga



A. Alaimo



R. Porcello



F. Savio



R. Tiedemann



A. Freedman



P. Gervasio



F. Rotzinger



P. Jella Jr.



F. Millone



D. Penrose



J. Palumberi



J. Daly



J. McFarland



M. Galgano



F. Maples Jr.



A. Berka



R. Steneck

Happy 25th service anniversary!



W. Wilber



J. Barszczewski



F. Giarasco



G. Patterson



D. Maresca



C. Bosque



P. Parsons



T. Casey



H. Saltzman



R. Lamont



G. Rowles



S. Capitano



C. Sutton



H. Ford



A. Seldon



M. Meehan



W. Stanton



J. Currie



F. Perugini



J. Cavalluzzo



S. Attard



W. Botticello



R. Reisch



R. Briemann



G. Turk



D. Janson



E. Baumgart



R. Beckmann



D. Wieman



D. Sproul



F. Camp



F. Schreiber



R. Bracco



J. A. Smith



C. Lewandowski



K. Sawyer

service milestones

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George M. Skurla, Grumman Aerospace President (5)
Dominick D. Taurone, Flt. Dev. Ops. (7)
Nicholas Messina, Tech. Reqmts. (30)

Dateline: March '44

Forty years ago this month, George, Dominick and Nicholas joined the Grumman War Production Corps. . . . A Truman Senate Committee Report states that Grumman deserves "special commendation because of the splendid work it has done for the naval aircraft program — both in designing superior planes and in obtaining large production." No other firm is mentioned in the report. . . . Plane News headlines tell the story in the Pacific: "Grumman planes strike 1,300 miles from Tokyo — lead carrier assault on Marianas Islands" and "Jake saw Navy team mop up at Kwajalein." On the homefront, Grumman hits a new peak in spare parts output. Grummanites enter a company-sponsored contest to name the folding wing that is featured on the Avenger, Hellcat and Wildcat. (The winner is "stowing.") Meanwhile, the world hears for the first time that the Navy is getting a new Grumman fighter — the F7F.

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Burton H. Pettit, Maj. Assy. (1)
Angelo J. Durante, Assy. Methods (2)
Louis Pastore, Assy. Methods (2)
John V. Sirvis, Opt. Tool. (2)
Gordon J. Alger, Detail Parts Fab. (3)
John W. Nordstrom, Tool Maint & Repair (3)
William Kielbasa, Elect. Test (4)
William Fox, Out-of-Prod. Spares (4)

Bernard P. Riemer, Prod. Plt. (4)
William J. Bartoszak, Q.C. Mech. Insp. (4)

Hobart N. Anderson, Prod. Plann. (5)
John M. Tilford Jr., PMM - Mil. & Space (5)

Herman J. Schonenberg, P.A. Mgmt. (5)
Bruno Jakob, Instruct/Anal. (7)
Harley G. Spinks, Prod. Mgmt. (7)
George R. Rose Jr., Airport Oper. (7)
Edward J. Dietz, Flt. Oper. Insp. (7)
Carl A. Lubin, PPM - Comm. & S/C (9)
Rudolph H. Dempster, ILS Elect. Pkag. (9)

Charles W. Bogardus Jr., Whse. (17)
Dorothy Kouwenhoven, Inv. Plann. & Anal. (30)

Joseph L. Jurgens, Gen. Comm. (30)
David M. Dudick, Gen. Subcontracts (30)
Robert P. Bauman Jr., Tech Reqmt. (30)
Robert J. Wood, J.S. Auto Cir. Anal. (35)
David C. Gaynor Jr., Prod. Cont. (43)
Valentino Tassone, Elect. Harn. Fab. (44)
Robert J. Allen, Tool Eng. (77)
Herbert Herrmann, Supplier Cont. (289)

Dateline: March '49

Thirty-five years ago this month, the company's telephone system changes from the old manual service to the dial system. . . . The daily hospital benefit for all Grummanites is raised to \$8 a day. In addition, the maximum amount payable against miscellaneous hospital charges is increased to \$80. The action is made because of "increased hospital costs in this area." . . . Assistant Secretary of the Navy Dan Kimball tours the Grumman planes to see how the Navy's new jet (the F9 Cougar) was progressing.

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Daniel Fass, Operations (1)
Daniel J. Anelli, Controls (1)
Walter A. Swanson, Stl. Parts Assy. (2)
Arthur Mauriello, Maj. Assy. (2)
James V. Minicozzi, Maint. Facil. Equip. (2)
Robert Mallin, Mach Oper. Parts Cont. (3)
Robert A. Jasinkonis, Maint. Admin. (3)
David L. Walsh, V.P. Marketing (5)
Henry W. Lada, Trans. Oper. (5)

Harold M. Moss, Adv. Sys. Mgmt. & Staff (5)

Ernest A. Andrews, F-14 Joining (6)
Richard Wink, Proj. Eng. Veh. (6)
John Umstetter, Flt. Test Mgt. & Stf. (7)
G. E. Garner, Maint. Admin. (12)
Orlando Vescio, Sys. Test (14)
Leroy T. Jaret, Corp. Procedures (28)
John J. Selva Jr., Mach. Parts/Matl. (30)
Neal A. DeLuca, Cont. Dev. (35)
Violet M. Pratesi, ILS Sect. Serv. (40)
Thomas F. Malone, Tool Eng. (77)

Dateline: March '54

Thirty years ago. . . the Plant 3 cafeteria is the site of the Institute of Aeronautical Sciences' Atomic Energy Applications Symposium. Lt. General James Doolittle predicts "the advent of atomic-powered aircraft by the end of the century — probably within 25 years." . . . Plane News features photos from the upcoming MGM film, "Men of the Fighting Lady," a motion picture featuring Navy pilots and Grumman Panther jets during the Korean Conflict. . . . With jet production increasing on Long Island, Plane News runs an article on thunder's latest competitor — the sonic boom.



A. Cooke



W. Gleich

25

Albert Umbach, Elec. Fab. (1)
Robert A. Carlson, ILS Admin. (1)
Giacomo J. Sanfilippo, ILS Tech. Serv. (1)
Clifford C. Seaman, Trans. Oper. (1)
James H. Bailey, Elec. Mech. Lines, (1)
Eugene R. Galatro, CTR Sect. Sub. Assy. (2)
Edward J. O'Rourke, Assembly (2)
Joseph W. Warren, Matl. Off-Site Sys. Cnt. (2)
Albert F. Bainton Jr., Matl. Mgmt. Staff (2)

(Continued on page 14)



A blizzard to remember. Old Man Winter doesn't like to say goodbye. Long Islanders found out the hard way when two snowstorms hit the Island in recent weeks. But the storms were timid compared to the blizzard of 1964. High drifts and arctic cold temperatures blanketed the Island. Above, Grummanites had to push their immobile cars into the Plant 5 hanger to defrost them. (Photo by Fred Annette)



W. Timmerman



F. Spitzer



I. Fried



W. Steck



G. Faeth



B. Vincent



H. Kampmann



B. Caputo



R. Hevner

milestones

(Continued from page 13)

Bart J. Verga, Die Shop, (2)
 Anthony Alaimo, Templates (2)
 Ralph Porcello, Form Block (2)
 Ferdinando Savio Jr., Comp. & Adhesives (2)
 Richard W. Tiedemann, Bond. Methods (2)
 Albert Freedman, Food Serv. (2)
 Philip E. Gervasio Jr., Honeycomb Prep. (3)
 John P. Barry, Tool Maint. Repair (3)
 Frederic L. Rotzinger, Qual. Lab. (3)
 Pierre C. Jelis Jr., Flt. Oper. (4)
 William Lanigan, Final Assy. Struct. (5)
 George F. Milione Jr., Env. Cont. (5)
 Augustus S. Sclafani, Adv. Aircraft Sys. (5)
 Wilfred B. Kleisler, Struct. Test (5)
 David H. Penrose, Struct. Test (5)
 John E. Palumberi Jr., Opes. Anal. (5)
 James E. Daly, Prog. Plann. Cont. & Budg. (5)
 Jerry L. McFarland, Eng. Test. Oper. (5)
 Frank W. Donroe, Eng. Test Oper. (5)
 Michael J. Galgano, Fld. Ops. Serv. (5)
 Frank E. Mapes Jr., Instr. Plann. & Cont. (6)
 Alfred E. Berka, Plt. Protection (6)
 Stanley Duroske, A6/EA6B Sys. Instl. (6)
 Robert C. Steneck, EF111 Struct. Mod. (6)
 William F. Wilber, Mach. Shop (6)
 Joseph F. Barszczewski, Corp. Instr. Flt. Data (6)
 Felix M. Garlasco, Mfg. Est. Adv. Prog. (9)
 George A. Patterson, Operations (9)
 Donald P. Maresca, Sub-Cont. Dev. (9)
 Claudio J. Bosque, Plastic/Plaster Tool. (11)
 Phillip M. Parsons, Maint. Rearrangement (12)
 Timothy F. Casey, Sys. Des. (14)
 Howard S. Saltzman, Lab. Mgmt. & Tech. (14)
 Richard W. Lamont, ILS Pubs. Prog. Mgmt. (15)

Dateline: March '59

Twenty-five years ago this month . . . The first Grumman/Army Mohawk nears completion in Plant 5 . . . The Grumman Gulfstream corporate airplane is at Stuart, Florida, test facility undergoing winter flight, takeoff and landing tests . . . A *Plane News* centerfold features the company's studies into the use of hydrofoils — on boats and on aircraft . . . The new N.Y. State tax withholding table is released (the tax bite is so little, we couldn't bear to publish) . . . The annual U.S. Savings Bond drive begins . . . top prize is a yellow Borgwald Isabella two-door sedan.

Gerald W. Rowles Jr., ILS Prod. (15)
 John S. Shlonsky, Prog. Mgmt. - Mil. & Space (25)
 Salvatore C. Capitano, ILS Resource Cont. (25)
 Craig Sutton Jr., Thermal Sys. (25)
 Harold A. Ford, Comm. Nav. & I.F.F. (25)
 Arnold Seidon, Elec. Countermeasure (25)
 Margaret A. Meehan, Benefits (28)
 Donald A. Burk, Fld. Admin & Lia. (28)
 William H. Stanton, Mech. Engg. (30)
 James W. Currie, Dist. Serv. (30)
 Francis Perugini, Gen. Acct. (30)
 Joseph D. Cavalluzzo, Prop. Acct. (30)
 Salvatore J. Attard, ILS Mech. Equip. Eng. (35)
 William A. Botticello, Comp. Aided Struct. (35)
 Dino George, Comp. Tech. Dev. (35)
 Roy P. Reisch, Sys. Sci. (35)
 Robert G. Brielmann, Qual. Ops Mgmt. & Admin. (35)
 George F. Turk, ILS Prog. Cont. Mgt. (39)
 Donald L. Janson, Career Ed. & Dev. (39)
 Elmer O. Baumgart, Instruct/Anal. (39)
 Robert C. Beckmann, Mfg. Bus. Mgmt. (40)
 Donald H. Wieman, A6 & EW Progs. (40)
 Daniel S. Sproul, Electro. Mech. Lines (40)
 Floyd A. Camp, Env. Cont. Des. (40)
 Frederick F. Schreiber, Fld. Pwr./Pyro. (40)
 Rosario A. Bracco, Propulsion Sys. (40)
 Joseph A. Smith, Sys. Integ. Ver. & Valid. (40)
 Morton Kommel, Software Appl. (40)
 Charles J. Lewandowski, Operations (40)
 Kendall A. Sawyer Jr., Repro. Serv. (43)
 Herbert W. Timmerman, Mech. Struct. & Assy. (43)
 Friedrich J. Spitzer, Methods Eng. A/C (43)
 Isadore R. Fried, Methods Eng. (43)
 Walter J. Steck, Resources (43)
 George F. Faeth, Ops. M/S (43)
 Andrew J. Bonavita, Reqmt's. Plann. (43)
 Robert A. Sullivan, Elect. Lia. Eng. (43)
 Bruno Caputo, V.P. Great River Operations (43)
 Robert E. Vincent, Avionics Purch. (44)
 Hans O. Kampmann, Aircraft Prog. (45)
 Ronald K. Hevner, Tech. Ops. (77)
 Arthur Cooke, Tech Ops. (77)
 Walter F. Gleich Jr. Corp. Sys. (111)

obituaries

AARNE KIIROJA of Tool Fabrication Mgmt. & Staff, Plant 2, died February 27 at the age of 40. He had been with the company since 1962 and resided at 9 Horseshoe Dr., Holbrook.
 GEORGE J. CAREY of Fuselage Joining, Plant 2, died March 6 at the age of 58. He had been with the company since 1957 and resided at 59 Coates Ave., Holbrook.

Tennis tournament Entry form

Name

Mail stop Ext

Singles (Check one) ☐ Men "A" Bethpage ☐ Women — Bethpage
☐ Men "B" Bethpage ☐ Women — Calverton
☐ Men — Calverton

Doubles (Check one) ☐ Men "A" Bethpage ☐ Women — Bethpage
☐ Men "B" Bethpage ☐ Women — Calverton
☐ Men — Calverton

Partner's name

Mail stop Ext

Mixed Bethpage Calverton
 Doubles (Check one)

Partner's name m/s Ext

Deadline: April 6th

Mail to: Bethpage — M. Cherry A01-28A, Calverton — J. Barrie A29-06

Tennis classic

Competition begins in May

"Tennis everyone" is the cry for this spring as the annual Grumman tennis classic gets underway. Men's and women's singles tournaments at both Bethpage and Calverton begin Monday, May 21. Doubles play starts on Monday, June 18 and mixed doubles competition opens the week of July 9th.

As in previous years, there are two divisions, "A" and "B", for men's singles and doubles in Bethpage. All 1984 varsity team members who enter must play in the "A" division tournaments — even if they are teamed with non-varsity partners.

Winners of the 1983 "B" division tournaments must play in the "A" division this year. All others will compete in the "B" division unless they elect to take on the "A" players.

Singles and doubles tournaments are open to Grummanites only. In mixed doubles play however, a

Grummanite may team up with a family member.

Participants may enter either the Bethpage or the Calverton tournament, but not both. Grumman Recreation recommends that contestants check their vacation plans before entering since match play must be completed during the week scheduled.

Varsity keglers win mixed tourney

The Grumman varsity mixed bowling team won the 22nd annual Long Island Mixed Tournament at Mid Isle Lanes. The victory was the first for the mixed team in the tournament since 1979. Teammates Marie Buttacavoli, Maureen Croes, Al Kirillin, and Ed Gabriel combined for a series total of 2,246 beating out second place LILCO by only two pins.

scorecard

In the lead

The Grumman men's varsity bowling team rolled to a four-pin early lead in the Long Island Industrial Tournament.

In the three-game first night of the 12-game tourney, the Grumman squad was in seventh place after bowling a 912 first game. The team moved into fourth after a 981 second game and took over first with a total of 1,027 for the third game of the day.

High scorer for the Grumman team was Al Kirillin who bowled a series of 637 with a high game of 227. Ed Hibert rolled a high game of 212 with a total of 590 for the three games, while Ed Gabriel had a high of 200 and a total of 586. John Ebron also rolled a high game of 200 and totalled 566. Jack Nielsen rolled 550 with a high game of 182.

The Grumman team's series of 2,920 for the first night leads second-place Nassau County CSEA and the PRD team who are both tied at 2,916. Defending tournament champs Pan Am follow in fourth place with 2,903. (More tourney coverage in the April 13 issue of *Plane News*.)

Icing another

The Grumman varsity hockey team beat a tough Grey Goose team in Long Island Industrial Hockey League play for the second time this season. The 6-3 victory was paced by center Mike LaBianca

who scored two goals. Teammates Jack Keane, Dave Drew, Tim Shelly, and Tom Carroll added one each.

In earlier league play, the Tomcats defeated previously unbeaten, number-one-ranked Ebets Field. The 8-2 victory gave the Tomcats a solid lock on second place as it prepares for

the league playoffs.

The varsity squad also outlasted Universal Cleaning in an 11-8 shootout in which LaBianca picked up four goals and two assists. Drew added a hat trick and three assists. Jim Allen had two goals and three assists while Keane and Carroll added one assist each.



Walking the boards. Rehearsing their rendition of 'Yes Sir, That's My Baby,' are seventh grader Jonathan Taylor and Grumman Data Systems' Bob Greaser. The two can be seen as the characters Nick and Murray Burns in the Grumman Theatre Guild's production of 'A Thousand Clowns,' playing April 6, 7, 13 and 14 at the J.F.K. Junior High School in Bethpage. Tickets are available at the Grumman Recreation Office in Pl. 28A.

Explore Orient

Grummanites have the opportunity to spend September 7-23 touring the Orient. Recreation is offering this 17-day vacation package for \$2,778 per person (double occupancy), a \$400 supplement for single room.

The Orient holiday tour includes air fare, all accommodations, full American breakfasts daily, choice of "dine around" dinners, sight-seeing, English speaking guide. Participants will visit Japan, Bangkok, Hong Kong, Singapore.

For more information, contact Ellen Drasser of Recreation, Ext. 2133/2269.

Racquetball

Anyone interested in joining the Grumman Racquetball after-work league should contact either Mark Sanders at ext. 391-5540 or Dan Nieves at ext. 391-5603. Both can be reached at mailstop A12-106. The league currently plays at Unique Racquetball Club in Bethpage on Tuesday, Wednesday and Thursday evenings at 5 p.m.

Philately sale

The Grumman Stamp Collectors club will hold the second half of a two-part stamp auction on Wednesday, March 28. The sale will be held at 5 p.m. in the Plant 35 cafeteria and will feature about 560 lots of U.S. stamps. For further information, call Steve Hoops at Ext. 3926.

calendar

Aikido Club: (Martial Arts) every Wed., 5 p.m., Recreation bldg. Beginners class. Guests welcome. M. Brooks, Ext. 115-6171/ H. Brondo, Ext. 2719.

Alcoholics Anonymous: every Mon., 4:30 p.m., Plant 15, conference room C, closed meetings; Personnel Relations, Ext. 3521. Great River meetings: every Wed., 4-5 p.m. T. Conley, Ext. 3521. Calverton: Chemical Dependency Discussion Group, every Mon., 4-5 p.m., Flt. Test Center, new conference meeting room, open meeting, Personnel, 369-6759 C. Robb, Ext. 117-7038.

Amateur Radio Club: every 3rd Wed. of the month. Plant 5 conference room BD-1, 5 p.m. B. Wengler, Ext. 0188.

Chess Club: every Fri., Recreation bldg., 5 to 11 p.m. Beginner to Expert, guests welcome. K. Marley, Ext. 4901/N. Corso, Ext. 9600.

Coin Club: (Calverton) every Fri., noon lunch, Plant 6, A-6 Action Center conference room. Grumman employees welcome. N. Evangelides, Ext. 117-7242.

Computer Club: 1st Mon. of every month, Recreation bldg., 7 p.m. Computer discussion and demonstration/ beginner to advanced programming. Guests welcome. J. Hayne, Ext. 4945/P. Frumkin, Ext. 5134.

Dance Club: every Wed., 5-8 p.m., Recreation bldg. Guests welcome. S. Koppell, Ext. 115-3800.

Duplicate Bridge Club: every Thur., Recreation bldg., 6 p.m. Guests welcome. P. Gill, Ext. 115-8414.

Equestrian Club: every weeknight, Knoll Farm, Brentwood, 6 p.m. Grumman employees and immediate family only. J. Eisenhower, 115-6211.

Fencing Club: every Wed., 4:45 - 6:30 p.m., Recreation bldg. Free instructions, guests welcome. J. Hayne, Ext. 4945/P. Chaldaris, Ext. 3486.

Folk Dancer's Club: (Calverton) every Thurs., 2nd floor, Plant 6, lunchtime, Grumman employees only. J. Hamelman, Ext. 117-6835.

Karate Club: every Tues. and Thurs., Recreation bldg., beginners 4:30 to 5:30, advanced 5:30 to 7:00 p.m., black belt

instructors, physical and mental development. New students at the beginning of each month. Guests welcome. T. Ortiz, Ext. 8497.

Klown Klub: every second Tues. of each month, Recreation bldg., 4:15 p.m. Guests welcome. M. Deyns, Ext. 7564.

Model Railroad Society: every Wed., 7 p.m., Recreation bldg., Regular meeting. Guests welcome. R. Muntz, Ext. 6865.

Magic Club: last Wed., of every month, The Magic Shop, Mid-Island Plaza, Hicksville, 4:45 p.m. Guests welcome. G. Albright, Ext. 5782.

Roller Skating Club: every Thurs., Levittown Skating Rink, lessons at 6:30 to 7:30 p.m. Guests welcome. H. Denen, Ext. 2291.

Stamp Club: First three Wed. of every month, 5-6 p.m., Plant 35 cafeteria, trading sessions and discussions. S. Hoops, Ext. 3926.

Table Tennis: every Thurs., Plant 24, 5 p.m. and every Fri., Recreation bldg., 5 p.m., also every lunchtime. Beginners and guests welcome. B. Fabricant, Ext. 9307.

Tap Dancing Club: every Mon., Recreation bldg., beginners 4:30 to 5:30 p.m., Intermediate 5:30 - 6:30 p.m. Guest welcome. P. Tropea, Ext. 2260.

Grumman Toastmaster Club: every Wed., GHQ bldg., third floor conference room A, 5 to 7 p.m. Grumman employees only. A. King, Ext. 6779/P. Ivy, Ext. 2931.

ASHRAE: Tues., April 10, Linden Tree, Bethpage at 6 p.m. Guests welcome. A. Rubenstein, Ext. 4016.

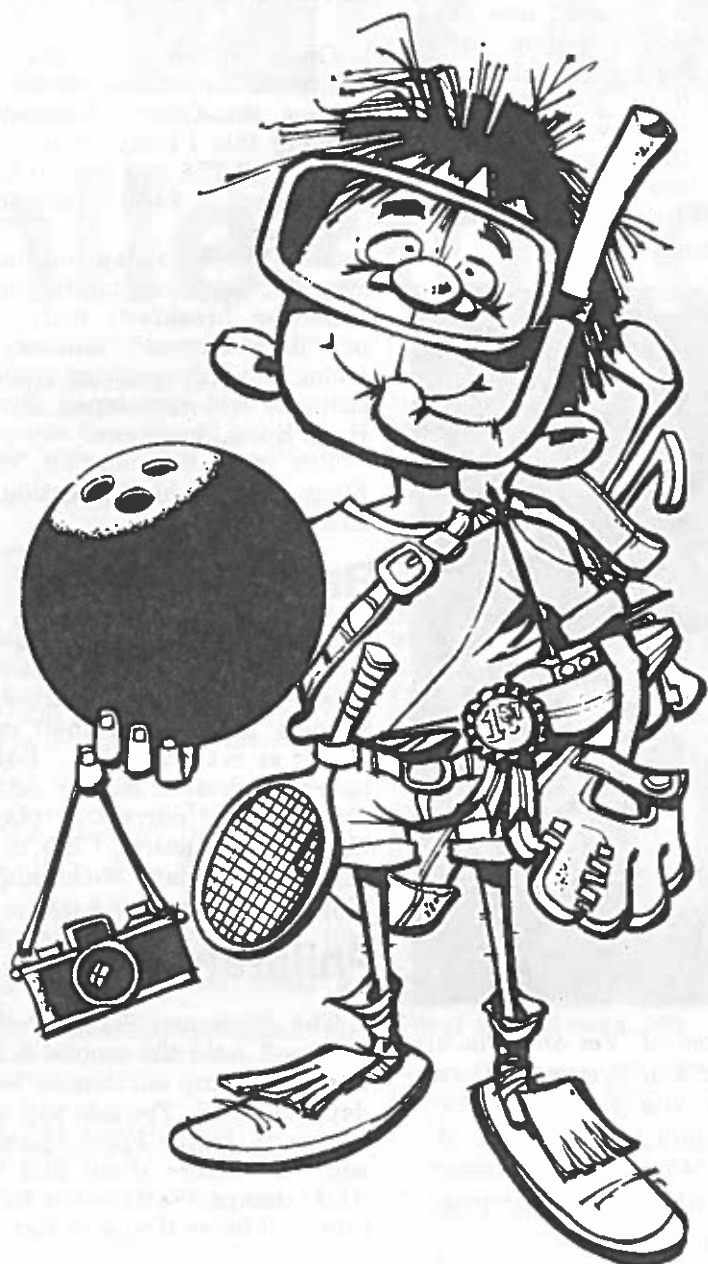
National Contract Management Assn.: Tues., April 10, Musicaro's, Melville, 4-6 p.m. workshop, guest speaker will be Joe Nass, Esq. Dinner 7 p.m., guest speaker will be Commander Edward A. Phoenix.

Retiree Club: Wed., March 28, Recreation bldg., at 1 p.m. Business meeting, spouses/friends welcome. Guest speaker will be Frank C. Campbell and Don Sparaco of Grumman Aerospace. E. Drasser, Ext. 2133.

Society of Manufacturing Engineers: Mon., April 9, Polytech Institute of N.Y., Farmingdale. Technical meeting, Computer Integrated Mfg., guest speaker will be Mr. Joseph Zambella of Cadling, Chicago, Ill. Guests welcome. V. Pavlik, Ext. 5253.

Recreation has it all

Become a member in April



From horses to horticulture and model railroads to motorcycles, if you're into it — chances are Grumman Recreation has it. Recreation sponsors over 50 different clubs and activities for Grumman employees and now it's time for Grummanites to show their support.

Annual effort

The annual Grumman Recreation membership drive — a tradition since 1942 — gets underway on April 1 and will end April 30 this year. Your \$1 membership fee will help Recreation continue to bring you a diverse variety of clubs catering to your favorite hobbies, bargain vacations for you and your whole family, and special tournaments to test your competitive spirit. Mike Cherry, drive chairman for 1984, points out that "proceeds from the annual drive are used strictly for intramural and club activities."

Something for everyone

Some of those activities include annual raquetball, tennis, billiards, bocce, and even Frisbee tournaments — open to all Grummanites. For those who prefer their competition a little less athletic, there are always the art and photo and assorted hobby shows as well as four Garden Forum exhibitions each year.

Of course Recreation offers a long list of different clubs for the varied interest of all Grummanites. There's the Corvette Club for those interested in high horsepower and the Equestrian Club for horse enthusiasts of a different kind. Two wheels more your speed? Then join the Grumman Cycle Club. If you prefer moving on your own two feet, then perhaps you'd be interested in the Grumman Road Runners.

How about Roller Skating? May I have this Dance? Table Tennis anyone? There's even the Theatre Guild for the thespian in all of us. And there are many, many more.

Better yet, if there isn't already a club to suit your interests, the Recreation office will be glad to help you get one started. Grumman Recreation director Charlie Fuschillo and his staff can provide you with all the information and assistance you need to find other Grummanites who share your interests.

Just one buck

Your \$1 membership contribution also helps sponsor the many lunchtime and after-hours activities offered, such as bocce, horseshoes, golf, softball, basketball, volleyball, bowling, and more. All are made possible through Recreation with your help.

Recreation also sponsors vacation bargains for you and your family from overnight ski trips to several weeks visiting the Far East — all at the best prices available.

For closer-to-home excitement, Recreation offers reduced-price tickets to many of the Long Island area's sporting events including baseball, hockey, soccer and others.

Let's join in

So, this year why not become a member of the Grumman Recreation Association and help make this drive 100 percent effective. You certainly can't lose anything and you may even turn out to be one of 15 winners of \$100 U.S. Savings Bonds or one of 50 winners of sets of Grumman glasses if your ticket is chosen. The prize drawing will be held soon after the close of the drive. If you wish any further information, call Recreation at Ext. 2133.

GRUMMAN

plane

news